

## A review of the *Satyrium* (*Superflua*) *sassanides* (KOLLAR, 1849) species group from “Russian” Central Asia

(Lepidoptera, Lycaenidae)

by

SERGEI V. CHURKIN & VLADIMIR A. PLETNEV

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**Summary:** The review embraces the taxa belonging to the *Satyrium* (*Superflua*) *sassanides* (KOLLAR, 1849) species group distributed in Tadjikistan, Kyrgyzstan, Uzbekistan and Turkmenistan. Five species were found: *Satyrium* (*Superflua*) *mirabilis* (ERSCHOFF, 1874), *S. (S.) deria* (MOORE, 1865), *S. (S.) turkmanica spec. nov.* (TL.: Turkmanistan, W. Kopetdagh Mts., 15 km E Nokhur v., Ipay-Kola loc.), *S. (S.) zabirowi spec. nov.* (TL.: West Pamirs, Vanch Mts., Gyshkhun v.), *S. (S.) muksuria spec. nov.* (TL.: Tadjikistan, Peter the Great Range, Depshar v.). A detailed study of the ♂ genitalia and the distribution of the species is presented.

**Резюме:** Данная ревизия включает таксоны относящиеся к группе видов *Satyrium* (*Superflua*) *sassanides* (KOLLAR, 1849). Пять видов населяет данную территорию: *Satyrium* (*Superflua*) *mirabilis* (ERSCHOFF, 1874), *S. (S.) deria* (MOORE, 1865), *S. (S.) turkmanica spec. nov.* (типовая местность: Туркменистан, Западный Копетдаг, 15 км вост. Нохур, к. Ипай-Кола), *S. (S.) zabirowi spec. nov.* (типовая местность: Западный Памир, Ванчский хр., к. Гишхун), *S. (S.) muksuria spec. nov.* (типовая местность: Таджикистан, хр. Петра Первого, к. Депшар). Детально исследовано строение гениталий самцов и распространение таксонов.

**Introduction:** *Satyrium* (*Superflua*) *sassanides* (KOLLAR, 1849) was described from Fars, South Iran. Formerly, this taxon was considered to be a single species distributed from Iran to Tian-Shan and Himalaya. The taxa *mirabilis* (ERSCHOFF, 1874) and *deria* (MOORE, 1865) were treated as its subspecies or synonyms (TUZOV et al., 2000).

*Satyrium* (*Superflua*) *persepolis* ECKWEILER & TEN HAGEN, 2003 and *S. (S.) khowari* CHARMEUX, 2004 were described recently.

The first and successful study of the group was published by WEIDENHOFFER et al. (2004). A comparative study of the genitalia and the external characters confirmed that the group consisted of at least several species, including *Satyrium mirabilis* ERSCHOFF and *S. deria* MOORE. It was marked that the taxonomy of *sassanides*-like butterflies from the territory of the former USSR (Russian Central Asia) needed to be clarified. There are no other studies on the representatives of this group distributed throughout this vast territory.

A comparison of the nominate *S. sassanides* KOLL. and *S. persepolis* ECKW. & TEN HAGEN with a series originating from North-West Kopetdagh shows that the last taxon represents a new species. Two other new species related to *S. deria* (MOORE) were found in the materials from Peter the Great range (Tadjikistan) and Vanch range (NW Pamirs, Tadjikistan), while *S. deria* (MOORE) proper populates the vicinity of Ishkashim, the south-western end of West Pamirs, well known as the westernmost limit of the fauna of the Himalaya. *S. (S.) mirabilis* (ERSCH.) inhabits Ghissar as a zoogeographical district, Alai, West Tian-Shan and low/medium stream of Naryn River up to

the Karakul town; the variability in these taxa is not high and will be discussed below. The holotypes will be deposited in the Darwin State Museum (Moscow). The paratypes are in the authors collection.

**Abbreviations:** FW - forewing; HW - hindwing; TL - type locality

*Satyrium (Superflua) mirabilis* (ERSCHOFF, 1874)

*Thecla mirabilis* ERSCHOFF, 1874, in: FEDTSHENKO, A.P.: Journey to Turkestan. Vol. II. - Mem. Soc. Amis. Sci. nat. Moscou 11 (2):7 (Tab.I, fig.4).

TL: Agalyk Gorge, Zeravshan valley.

A syntype (♀) is deposited in the collection of the Museum of the Moscow State University (ANTONOVA, 1981: 210).

Colour plate 2, 3: 3-4 (Kondara), 5 (Kugitang), 6 (Talas), 11 (Khozratisho), 12 (Rushan).

Material (only the series the representatives of which were dissected and examined are mentioned): 5 ♂♂, 5 ♀♀, Kyrgyzstan, Kyrgyzsky Range (southern slopes), Talas River valley, 3 km E Aral v., 1700 m, 3-4.06.2001, S. CHURKIN leg.; 2 ♂♂, 2 ♀♀, Kyrgyzstan, West Tian-Shan, SW Chatkal Range, Sumsar v., 1200 m, 4.06.2001, S. CHURKIN leg.; 3 ♂♂, 3 ♀♀, Kyrgyzstan, West Tian-Shan, Chatkal Range, Kassan-Sai R., 1400 m, 6.06.2001, S. CHURKIN leg.; 5 ♂♂, 3 ♀♀, Kyrgyzstan, Bosbu-Too Mts., Bos-Byik v., 1700-2100 m, 1.07.2008, A. KLIMENKO leg.; 1 ♂, Kyrgyzstan, 15 km N Tash-Kumyr v., Naryn R. valley, 1000 m, 27.05.2000, A. KLIMENKO leg.; 2 ♂♂, 1 ♀, Kyrgyzstan, Fergansky Range, Karakul v., 06. 2005, S. CHURKIN leg.; 2 ♂♂, 2 ♀♀, Kyrgyzstan, Kichik-Alai Range, Ak-Bura R., Maidontal v., 1800-2200 m, 24.06.2009, S. CHURKIN leg.; 3 ♂♂, 2 ♀♀, Kyrgyzstan, Alai Mts., 20 km SE Kyzyl-Kiya, Chauvay v., 1700 m, 21.06.1995, S. CHURKIN leg.; 3 ♂♂, 3 ♀♀, same loc., 20-25.06.1998, A. PETROV leg.; 3 ♂♂, 3 ♀♀, Kyrgyzstan, Alai Mts., Aksu R., Kara-Shoro loc., 2200-2400 m, 23.07.1995, S. CHURKIN; 3 ♂♂, 1 ♀, Kyrgyzstan, Alai Mts., Surmetash R., 1800 m, 12.07.1995, S. CHURKIN; 2 ♂♂, 2 ♀♀, Kyrgyzstan, Sokh R., Korgon v., 5-10.07.1998, 2000 m, A. PETROV leg.; 1 ♀, Kyrgyzstan, Matcha Mts. (Turkestanysky Range), Ak-Terek R., Noo-Dzhailo valley, 2600 m, 9.07.1998, A. PETROV leg.; 5 ♂♂, 5 ♀♀, Tadjikistan, Fanskie Mts., Urech R., 7 km S Madovra v., Artuch loc., 2200-2400 m, 6 – 14.07.1998, VASILCHENKO YU. leg.; 2 ♂♂, 2 ♀♀, Tadjikistan, West Ghissar, Shing R., Nofin Lake, 2400 m, 17.07.1993, S. CHURKIN leg.; 1 ♂, 1 ♀, Tadjikistan, West Ghissar, Shing R., Khazor-Chashma Lake, 3000 m, 20.07.1993, S. CHURKIN leg.; 2 ♂♂, 1 ♀ S. Tadjikistan, Babatag Mts., Dzharteppa v., 12.05.2000, 1000 m, S. CHURKIN leg.; 2 ♀♀, Tadjikistan, Ghissar (southern slopes), Kondara R., 12.06.1981, V. Soljanikov leg.; 1 ♂, 1 ♀, Tadjikistan, Ghissar (southern slopes), Mazorkoza Pass, 2250 m, 11-16.07.2003, Perepechaneko leg.; 6 ♂♂, S. Tadjikistan, Khozratisho Range, Nikolaevsky Pass, 2500 m, 23.06.2000 m; 3 ♂♂, 4 ♀♀, Turkmenistan, Kugitang Mts., Karljuk, 9.05.1991; 2 ♂♂, Tadjikistan, West Pamirs, Rushan distr., 10-20.07.2002, 3500 m, V. GURKO leg.

**Description:** A well known butterfly, commonly found in collections and pictured in the books (usually under the name “*sassanides*”).

FW length is 14.0-15.5 mm in the ♂♂ and 14.3-16.5 (very rarely 17.5 and even more) in the ♀♀, everywhere except several cases: the specimens from the Naryn River valley look slightly larger (but these are only several specimens); the specimens from the southern slopes of Ghissar and Kugitang are statistically larger (especially the ♀♀), while the ♂♂ from Khozratisho are definitely smaller (FW length 13.6 – 14 mm). In general, the size is much larger than in Iranian species.

**Male:** Upperside dark brown, FW fringes whitish, HW fringes darkened. The tails are obviously smaller (shorter) than in *S. sassanides* (KOLL.) or *S. persepolis* ECKW. & TEN HAGEN. A black line is developed at the margin of the wings. The androconial patch is developed, but it is definitely not the same as in *S. sassanides* (KOLL.): this is a very narrow and long black patch in contrast to a shorter and wider triangular androconium of both Iranian species; this difference was not noted by WEIDENHOFFER et al. (2004). Sometimes the androconial patch is not so conspicuous being more or less erased in worn specimens. Important to note, that the ♂♂ as well as the ♀♀ often have a darkened short vein which locks the distal end of the cell - this feature may confuse somebody because sometimes it is not less conspicuous than the non-contrasting androconium.

HW anal lobe without obvious orange spot on the upperside, as a rule. The underside has the same colour as the upperside, only the base of the HW with a very slight greenish suffusion. A marginal white line is developed on the HW but reduced on the FW (sometimes conspicuous, but not long and not bright). FW underside with a postdiscal white line consisting of 5 (as a rule) straight parts and broken/curved at the vein M3 (exceptions are very rare). The submarginal blackish spots are well developed; two of them are large and rounded, other 2-3 (sometimes even 4) spots are small. HW underside with a wide solid postdiscal line internally edged with black, this line is not straight, but wavy and strongly curved inwardly at the anal angle. The submarginal row of blackish spots is complete having 4 (and only very rarely 3) small spots upper the main spot Cu1-Cu2. The latter consists of 3 parts: orange inner part, triangular blackish inner spot and rounded or rectangular external spot. The Cu1-2A space contains a bluish spot with 2 blackish dots internally. Anal lobe with orange spot and blackish area near the fringes.

**Genitalia** (fig. 1 b, d): Figured in the “Palearctic Guide” (WEIDENHOFFER et al., 2004: fig.50). As a whole, the distal part of the valva is much longer than in both Iranian species, while the membranous projections of the vinculum are small but conspicuous (in contrast to *S. deria* MOORE). The characters of the aedeagus are also important and specific, this being not noted by WEIDENHOFFER; they will be discussed separately below (fig.2 c).

The genitalia of the ♂♂ originating from West Tian-Shan, Naryn, Alai and West Ghissar seem to be nearly identical and only slightly variable. Only the ♂♂ from Khozratisho Range (South Tadjikistan) and Kugitang show small differences.

**Female:** The colouration is the same as in the ♂♂ except the absence of the androconium. Wings slightly wider, size slightly larger, tails sometimes longer than in the males (but not always - i.e. the length of the tails is relatively variable). As marked above, the short end-cell vein is darkened, looking sometimes as an unclear androconial patch.

The underside pattern is more developed than in the ♂♂: the rows of the blackish spots on the FW and HW are always complete.

**Distribution and variation:** The butterflies from North Alai and Tian-Shan have darker underside - so, that the whitish touch at the end-cell vein on the HW underside becomes slightly obvious. The ♀♀ originating from the southern slopes of Ghissar often have widened white postdiscal line on the HW (and large size).

The most interesting series is that from Khozratisho, South Tadjikistan: the butterflies are small with angled wings which look narrower than usual; the genitalia also have some small differences. Unfortunately, we have no ♀♀ from this place - but the characters in general seem to be

opposite to the characters of the nearest Ghissarian macropopulation. At present, we are not ready to describe it as a subspecies but the question needs further clarification.

The two ♂♂ from Rushan, West Pamirs (V. GURKO leg.; the altitude stated in the label - 3500 m.a.s.l. - seems to be wrong) represent another problem. Both have the genitalia similar to those of *S. mirabilis* (ERSCH.) (but not fully identical) as well as external characters, but the wings are definitely wider than in the specimens from Khozratisho (a geographically intermediate population between Ghissar and West Pamirs). A photo of a very similar butterfly originating from Khorog, West Pamirs was published by TSHIKOLOVETZ (2004: plate 30, fig. 13). It is important to have more material to clarify the status of the Westpamirian population. Some characters relate it with *S. (S.) khowari* CHARMEUX, 2004 described from Chitral where it was found together with *S. deria* (MOORE). This taxon was treated as a synonym of *S. mirabilis* (ERSCH.) in "Palearctic Guide", however, the figure of the genitalia was not published. We can not exclude that *S. khowari* CHARMEUX represents a bona species distributed from Chitral to West Pamirs along the Hindukush system.

As a whole, the distribution area covers West-Tian Shan and Fergansky Range along Naryn River, Alai, the whole Ghissar and South Ghissar as zoogeographical districts - and, probably, West Pamirs. We have not seen any material from the Alai Valley. In spite of all efforts, it has not been found on the eastern slopes of Fergansky Mts. in the upper part of Naryn valley (Inner Tian-Shan).

**Biology:** Not well studied yet. One generation. Flies on dry slopes and in valleys from 1000 to 3000 m.a.s.l. and from May to July depending on the altitude (according to some authors, the lowest known altitude is 500 m.a.s.l.). Food plants *Amygdalus* spp. and *Cerasus verrucosa* (TORPOV & ZHDANKO, 2009).

*Satyrium (Superflua) turkmanica* spec. nov. (colour plate 2, 3: 1 - 2)

Holotype ♂, W. Turkmenistan, W. Kopetdagh Mts., 15 km E Nokhur v., Ipay-Kola loc., 100 m., 8-20.06.1996, A. PETROV leg. Paratypes: 3 ♂♂, 3 ♀♀, same data.

**Description and diagnosis:** ♂ FW length 15 mm in the holotype, 14.8-16.0 mm in the paratypes. The size is in general the same as in *S. mirabilis* (ERSCH.) but much larger than in the Iranian species. Antennae, body, wings shape and upperside colouration (including fringes and marginal black line) as in *S. mirabilis* (ERSCH.) with one important exception: the androconial patch the same as in the Iranian species (*S. persepolis* ECKW. & TEN HAGEN and *S. sassanides* (KOLL.) - i.e. comparatively large with a triangular shape, it is thicker, shorter and very conspicuous in contrast to *S. mirabilis* (ERSCH.). The underside is also similar to that of *S. mirabilis* (ERSCH.). It differs easily from both Iranian species in the solid widened white postdiscal line on the HW. Compared to *S. mirabilis* (ERSCH.), the HW postdiscal white line is not so wavy, more straight, but this character is variable and often not so distinctive. The HW submarginal pattern and tails are the same as in *S. mirabilis* (ERSCH.). The white line on the FW underside consists of 5 parts, each part being not straight as in *S. mirabilis* (ERSCH.), but concave - so, that the line looks wavy. This character is not fully constant but the line never looks straight as it is in *S. mirabilis* (ERSCH.).

**Genitalia** (fig. 1 a): More similar to the genitalia of the Iranian species, with a short distal part (the basal part twice longer), and very different from the genitalia of *S. mirabilis* (ERSCH.). The aedeagus (fig.2 b) is very thin and small, opposite to the aedeagus of *S. sassanides* (KOLL.) and

comparatively similar to that of *S. persepolis* ECKW. & TEN HAGEN.

**Female:** FW length 14.8-16.0 mm. Similar to the ♂, androconium is absent but dark cell vein is expressed on the FW upperside (the same as in other species in study). The underside pattern is more developed, especially the submarginal pattern. It is necessary to note that the females of *S. mirabilis* (ERSCH.) from Kugitang and Southern Ghissar have widened and enlarged postdiscal white line - obviously thicker than in the ♀♀ of the new species.

**Distribution and variation:** Known only from the type locality; the distribution area may cover all northern slopes of Kopetdagh. The representatives of the group are widely distributed in Iran and Turkmenistan. However, specimens from the southern slopes of Kopetdagh (Khorasan) we dissected and examined belong to the *persepolis*-complex (maybe a new subspecies) and easily differ from the new species in their small size, not solid white line, long tails and genitalia characters.

We have no series from the central or eastern parts of Kopetdagh. TSHIKOLOVETZ (1998: plate 8, fig. 37-45) published the photos of several specimens from Firyuza (south from Ashkhabad, Central Kopetdagh). Unfortunately, the quality of the colour plates provides no possibility to make a true identification. The underside pattern of the FW looks not so wavy (but not fully straight); this character can be variable, as noted. Unfortunately, the most important distinction - i.e. the shape of the androconium - is not well visible.

Eastern Turkmenian mountains (Kugitang range and other belonging to South Ghissar zoogeographical district) are populated by *S. mirabilis* (ERSCH.). We can not exclude the presence of this species also in Kopetdagh: in this case two species can fly together as it is known for Iran or Pamirs. However, this version seems to be doubtful.

**Biology:** Unknown. One generation. Prefers medium altitudes and bushes on slopes and in river valleys.

**Etymology:** Toponymic name.

*Satyrium (Superflua) deria* (MOORE, 1865) (colour plate 2, 3: 13)

*Thecla deria* MOORE, 1865, Proc. Zool. Soc. Lond. **1865** (2): 507.

TL: NW Himalayas, Upper Kunawur R.

Material: 1 ♂, Tadjikistan, W. Pamirs, Ishkashimsky range, Ishkashim, 21-25.06.2001, A. PETROV leg.

The photos of the *deria*-specimens were published in WEIDENHOFFER et al. (2004) and by CHARMEUX (2004). A photo of another specimen from Ishkashim was published by TSHIKOLOVETZ (2004: plate 30, fig. 15); the characters of this ♂ also agree with the *deria*-characters.

**Description:** ♂ FW length 15-18 mm according to the "Guide"; the specimen from Ishkashim has 16.1 mm. The antennae, body, wing shape and upperside colouration as in other species (FW angled, upperside dark-brown with black marginal line, fringes whitish on FW and darkened on HW). Androconium vestigial, practically absent, only the dark cell vein is slightly obvious.

The underside has the same colouration; white marginal line is developed on HW and reduced on FW. White postdiscal line on HW is more or less straight compared to that of *S. mirabilis* (ERSCH.), internally edged black and looking solid, but more careful examination shows that it is slightly, indistinctly separated to several sections by the darkened veins. This character is not so expressed as in *S. sassanides* (KOLL.) - but was not marked by WEIDENHOFFER. More important,

that this white line is slightly but distinctly prominent towards the base of the wing (especially compared to two new related species, see below). The submarginal pattern is reduced compared to *S. mirabilis* (ERSCH.) but more developed than in the new species from West Pamirs and Peter the Great Range (see below): the main spot Cu1-Cu2 is large, with deep orange median part, 1 or often 2 additional submarginal blackish spots are developed; the anal blush spot and anal lobe have no specific characters. The white postdiscal line on the FW underside consists of more or less straight spots, which are however slightly wavy (not as in *S. turkmanica spec. nov.*, but not fully identical to those in the typical *S. mirabilis* (ERSCH.)). The row of blackish submarginal spots is not complete but not strongly reduced: two rounded spots and 1 or 2 additional spots are developed but often reduced in size.

**Genitalia** (fig. 1 e). The ♂ examined fully agrees with the figures published in WEIDENHOFFER et al. (2004: page 49) - the shape of the valva is specific, vinculum bears two large projections which nearly touch the valvae. In addition, the aedeagus is obviously longer than in *S. mirabilis* (ERSCH.) or *S. turkmanica spec. nov.*, with thin distal part (fig. 2 e).

**Female:** According to the published photos, it is similar to the ♂ with more developed pattern on the underside (especially submarginal blackish spots). The white line on the HW underside is more distinctively prominent (differences from the ♀♀ of the species with a straight line are more obvious).

**Distribution:** The distribution area covers a large territory from NW Himalays to the southwestern edges of the Pamirs (India, Pakistan, Afganistan, Tadjikistan). We suppose, however, that the species does not penetrate the Pamirs further to the north, where another but related species are known to occur.

The material is not sufficient to discuss the variability which however seems to be not high.

**Biology:** Not known. Certainly, one generation. Flies sometimes higher than other species because it inhabits more southerly territories.

*Satyrium (Superflua) mukuria spec. nov.* (colour plate 2, 3: 7-8)

Holotype ♂, Tadjikistan, Peter the Great Range, Depshar v., 2200-2500 m, 18.07.2009, S. SALUK leg. Paratypes: 1 ♂, 5 ♀♀, same data; 7 ♂♂, 9 ♀♀, Tadjikistan, Peter the Great Range, Muk v., 2200-2400 m, 15.07.2009, S. SALUK leg.; 1 ♂, 1 ♀, Tadjikistan, Peter the Great Range, Darai-Nazarak v., 1-8.07.2003, PAK O. leg.

A photo of a specimen from Peter the Great Range was published by TSHIKOLOVETZ (2004: plate 30, fig. 16); this specimen definitely belongs to the new species and can be easily distinguished from all other specimens figured in the same plate by the characters listed below.

**Description and diagnosis:** ♂ FW length 14.5 mm in the holotype, 14.5-15.2 mm in the paratypes. Definitely smaller than other species. Antennae and body have no specific distinctions. Wing shape is different from all other species: FW with shortened costal side and convex termen, so that the apex looks not so angled. The upperside colouration is dark-brown with an unusual yellowish-lead shining (hue). The androconial patch is absent as in *S. deria* (MOORE); HW looks darker than FW. The black marginal line is well developed; the anal lobe on HW with slightly obvious orange dot (as a rule, absent in other species). Fringes slightly darker than in *S. mirabilis* (ERSCH.). Tails are shorter (but not thinner) than in *S. mirabilis* (ERSCH.).



Underside dark grey-brown with a lead hue, differing from the normal brown colour of other taxa. The white marginal line is conspicuous only on HW and practically absent on FW.

The white postdiscal line on HW is straight from the costal part (with only one wavy median section), wide, solid and blackened externally [*S. deria* (MOORE) has this line prominent internally]; it is very strongly curved inwards and angled in the anal part. The submarginal row is strongly reduced from the costal side - so, that only one small blackish spot is developed upper the main spot Cu1-Cu2. Very rarely, the second upper spot is indistinctly visible. The main cubital spots and anal pattern are normally developed. The area between the HW margin and postdiscal line looks much wider than in other species because the line is straight while the submarginal pattern is reduced.

The FW underside: postdiscal line consists of straight spots, like in *S. mirabilis* (ERSCH.). The submarginal row consists of only 2 rounded spots, other spots are always absent.

**Genitalia** (fig. 1 c): These differ from the nearest *S. deria* (MOORE) because of the strong reduction of the membranous projections of the vinculum, which are much smaller even compared to *S. mirabilis* (ERSCH.); the valva also has specific features. Aedeagus (fig. 2- d) is long and similar to that of *S. deria* (MOORE), and differs from that of *S. mirabilis* (ERSCH.), but the distal part is comparatively widened.

**Female:** FW length 14.5-15.5 mm. Very similar to the ♂, but the tails are variable in size and often similar to those of *S. mirabilis* (ERSCH.). The wings are wider, but the differences in the wings shape from other species are obvious. The underside pattern is practically the same as in the ♂ - it means that the differences in the development of the submarginal spots on the underside are deeper between the ♀♀ of the new species and all known species (except *S. zabirowi* spec. nov., see below).

**Distribution and variation:** Known from two localities from Peter the Great range (Surkhob River basin). The butterflies from Darai-Nazarak v. (not far from Tadjikobad and close to the well-known Ganishou or Ganishob v.) seems to be slightly more brownish but this needs confirmation; the genitalia are identical. We can not exclude that it will be found in the Alai Valley. Not known from the Vakhsh River valley, where it can fly together with *S. mirabilis* (ERSCH.).

**Biology:** Not studied. Food plant is unknown. The habitat is typical for the group. One generation.

**Etymology:** Toponymic name.

*Satyrium (Superflua) zabirowi* spec. nov. (colour plate 2, 3: 9, 10)

Holotype ♂, Tadjikistan, West Pamirs, Vanch Mts., Gyshkhun v., 2000 m, 26-30.07.1992, S. CHURKIN leg.

Paratypes: 1 ♂, same data; 1 ♂, same loc., 2000-2400 m, 8-15.07.2002, A. PETROV; 2 ♂♂, 3 ♀♀, same loc., 1800-2000 m, 1-2.07.2001, T. GAZIEV leg.; 1 ♂, Darvaz (Darvas) Range, Kalaikhumb vic., 12.07.1990, CHURKINA L. leg.; 1 ♂, West Pamirs, Vanch Mts., Gyshkhun v., 2200 m, 22.07.2009 (in coll. CHARMEUX).

**Description:** ♂ FW length 14.5 mm in the holotype, 14.3-15.5 mm in the paratypes. Closely related to the previous species, but has normal dark-brown colouration of the upperside and normal wing shape [only the apex is not so angled as in *S. mirabilis* (ERSCH.)]. The size is slightly larger compared to *S. muksuria* spec. nov., but smaller than in other species.

The antennae and body have no specific distinctions. The androconial patch is absent. The black marginal line is developed. Tails short. The small orange anal spot is even more developed than in *S. muksuria spec. nov.*

Underside with normal brownish colour. The white marginal line is conspicuous only on HW and practically absent on FW. In general, the pattern is the same as in *S. muksuria spec. nov.* and differs from other species in the considerable reduction of the submarginal blackish spots and in the straight costal part of the postdiscal HW white line [which is wavy in *S. mirabilis* (ERSCH.) and prominent in *S. deria* (MOORE)]. Differences with *S. muksuria spec. nov.* (in addition to the different ground colour) are small but present: 1. the Cu1-Cu2 submarginal spot is larger and more contrasting, this spot as well as small blackish submarginal spot having distinctive whitish suffusion from their inner sides (in previous species this whitish scales are absent or only very slightly visible); 2. the FW submarginal spots are often not rounded but stretched along the termen, having the shape of vertical ovals or even being rectangular; however, some *deria*-specimens can also demonstrate this feature.

**Genitalia** (fig. 1 f): The aedeagus (fig. 2–f) is long with widened distal end (even wider than in the previous species, while the proximal part is distinctly longer). The membranous projections are more developed than in *S. muksuria spec. nov.* but not very large in contrast to *S. deria* (MOORE) – i.e. their size is similar to that in *S. mirabilis* Erschoff. The valva is most important: the basal part is more angled, while the distal part is thinner and distinctly curved (some other features see below). The genitalia of the specimens from Vanch are identical to the figured genitalia of a Darvazian male; the latter is figured because this locality is the closest to Darai-Nazarak, Peter the Great (*S. muksuria spec. nov.*).

**Female:** FW length 14.2–15 mm. Similar to the ♂, but the submarginal rows of blackish spots on the underside are slightly more developed, the HW series often includes one more small spot compared to the ♂♂. One ♀ has an unclear but visible additional spot on the FW upperside. Worth to note that even the ♀♀ have FW submarginal spots slightly stretched vertically.

**Distribution:** The species certainly inhabits the slopes of Darvaz and Vanch Mts. along the Vanch River. The specimen from Kalaikhumb proves that the distribution area can reach other Pamirian ranges, but I have no material to confirm this. We suppose that the ♂ from Vanch Range figured in TSHIKOLOVETS (2004: plate30, fig. 14) belongs to *S. zabirowi spec. nov.*

**Biology:** Not studied. The habitat, altitudes and flight period as in the related species.

**Etymology:** The species is named after ROZIKBEK ZABIROV, professional biologist and friend who helped S. CHURKIN in difficult expeditions to Pamirs.

**Note:** Firstly we had no idea to describe this taxon as a species and tried to unite it with *S. muksuria spec. nov.* Both species represent true and young vicariants, but the differences in the wing shape, general ground colour together with constant differences in the genitalia did not allow to unite them. The distribution areas of the species are separated by very high ranges and giant glaciers, providing a total isolation between the basins of Pjandzh R. and Surkhob R.

**Male genitalia:** We dissected and examined more than 35 different representatives of the group, including 3 specimens of *S. sassanides* (KOLL.) and several specimens of *S. persepolis* ECKW. &



TEN HAGEN from different parts of Iran.

The structure of the genitalia of the group as well as very good figures for all previously known species were published by WEIDENHOFFER et al. (2004); our studies confirm all marked characters. However, one important note must be added: not only *S. deria* (MOORE) (fig. 1 e) has membranous projections (of vinculum, as it is supposed by WEIDENHOFFER - this needing some more studies). As a whole, the membranous sclerites are developed on both lateral sides of the genitalia, covering the bases of the falces and the area below it. One side of each membranous sclerite is connected with vinculum, the other side is supported by the chitinized tenton stretching between the proximal part of tegumen and vinculum. This structure is developed in all species and is not important for the specific diagnosis, but may be important for understanding of the taxonomic position of the group as a whole (we are unable to discuss it here because a comparison with other groups of *Satyrium* is needed, but such projections are known for *S. prunoides* STGR., 1887).

More important, that sometimes these membranous sclerites are enlarged forming true and well visible projections: the free part of each membranous sclerites are freely placed internally from the tendon being directed to the basal parts of the valva.

These projections are found by WEIDENHOFFER et al. (2004) in *S. deria* (MOORE) and correctly placed as a specific character. However, all other species of the group also have these projections, but they are very small (strongly reduced and only slightly visible) in the Iranian species and in *S. muksuria spec. nov.*, representing a serious difference between this species and its relatives. Two species - *S. mirabilis* (ERSCH.) and *S. zabirovi spec. nov.* - have these projections medium-sized, more or less distinct but not enlarged. In general, these projections must protect the valvae and, at the same time, must limit the possibility of the valvae to move. Thus, these characteristic seem to be important for the copulation.

Other valuable characters are as follows: the shape of the valva and the structure of the aedeagus, the last complex of characters being nearly ignored by WEIDENHOFFER et al. (2004).

Both Iranian species and *S. turkmanica spec. nov.* are characterized by the enlarged basal (proximal) part of the valva; the distal part is obviously shorter than the basal part (fig. 1 a, fig. 2 g). This character is clearly correlated with the wide and dense androconium. However, *S. sassanides* (KOLL.) has a large and wide aedeagus (fig. 2 a), in contrast to all other taxa, including *S. persepolis* ECKW. & TEN HAGEN (it was marked in the original description but not noted in the "Palearctic Guide"). *S. turkmanica spec. nov.* (fig. 2 b) has the aedeagus similar to that of *S. persepolis* ECKW. & TEN HAGEN., but with shorter distal part [at the same time the distal part is shorter than in *S. mirabilis* (ERSCH.) as well]. The valva of *S. turkmanica spec. nov.* (fig. 1 a) has a very different shape compared to that of *S. persepolis* ECKW. & TEN HAGEN. (see page 51 in the "Guide"); so, its characters are definitely specific.

**Note:** We examined several specimens of a *persepolis*-like butterfly from Khorasan prov. which look externally different from the nominate specimens originating from Fars - but the genitalia seem to be very similar if not identical. ECKWEILER & TEN HAGEN (2003) did not find any *S. sassanides* (KOLL.) in Khorasan or other parts of North Iran. The same is true for the material collected in Iran by K. KOLESNICHENKO & A. DEVYATKIN: only *persepolis*-like specimens were found. We suppose that they belong to an undescribed subspecies of *S. persepolis* ECKW. & TEN HAGEN, but the

status of these populations is out of the limits of the present paper and the territory in study.

*S. mirabilis* (ERSCH.) (fig. 1 b, d) is characterized by the small but distinct membraneous projections, the thin and comparatively long aedeagus and specific shape of the valva. The aedeagus has very short basal (proximal) part and is obviously shorter as a whole than in all species belonging to the *deria*-complex (fig. 2 c). The variability of the genitalia is small, except some cases. Rarely, some specimens have slightly widened distal ends of the valva (especially in the Kugitang population), more similar to other species. However, the basal part is never longer than the distal one (in contrast to *S. turkmanica spec. nov.*), the inner parts of the distal ends of the valva are not widened and enlarged (compared to all other species in study). The ♂♂ originating from Khozratisho have some differences in the structure of the valva (fig. 1 d): it is smaller and slender, obviously more graceful compared to the common variant. This is correlated with the smaller size of the butterflies and genitalia as a whole - so, this problem needs further clarification and more material.

*S. deria* (MOORE) (fig. 1 e, fig. 2 e) readily differs from other species in the very large membraneous projections and specific shape of the valva with expanded upper section of the basal part, long distal part of the valva with widened external sides of the distal end. This species has the longest valva and a very long and thin aedeagus.

*S. muksuria spec. nov.* (fig. 1 c, fig. 2 d) differs from all other species in the opposite version of the structure of the membraneous projections, which are strongly reduced and nearly absent. The aedeagus is similar to that of *S. deria* (MOORE), but its distal part (before the distal end) is definitely wider, while the basal part is slightly shorter. Interesting, that the individuals of this species are smaller than the individuals of *S. deria* (MOORE), but the length of the aedeagus is the same [i.e. obviously longer than in *S. mirabilis* (ERSCH.) or *S. turkmanica spec. nov.*]. The upper section of the basal part of the valva is even more expanded with a strongly developed second (additional) lateral rib (visible as a developed second line on the body of the valva in the figure). The inner sides of the distal ends of the valva are more developed and widened than in *S. deria* (MOORE) or especially *S. mirabilis* (ERSCH.), but the external sides and distal spines are more or less similar to those of *S. deria* (MOORE).

*S. zabirowi spec. nov.* (fig. 1 f, fig. 2 f) is characterized by the more or less developed membraneous projections of vinculum - more similar to *S. mirabilis* than to its more externally similar relatives - *S. deria* and *S. muksuria spec. nov.* The basal part of the valva is also very expanded, but only close to the distal part, i.e. the additional rib is obviously shorter and the general shape of the valva is more angled. The inner sides of the distal parts are only slightly widened [the structure is even similar to that in *S. mirabilis* (ERSCH.)] but these distal parts are obviously curved, so that the distal spines are situated not in parallel but at some angle to each other. The aedeagus is similar to that of two related species, but its distal parts are also wider than in *S. deria* (MOORE) and even wider than in *S. muksuria spec. nov.*

As a whole, each species has distinctive specific features in the structure of the genitalia, sometimes very significant. It means that these species are not very young but represent relatively old and well formed taxa. Even *S. muksuria spec. nov.* and *S. zabirowi spec. nov.* which may be considered as the youngest species belonging to the complex have important and valuable differences.

**Discussion:** The territory in study is populated by 5 species: *S. turkmanica spec. nov.* from Kopet-dagh, with a large androconial patch and the valva similar to that of the Iranian species, while the size and main colouration recalls *S. mirabilis* (ERSCH.); *S. deria* (MOORE) from SE part of the Pamirs, with vestigial androconium and enlarged membraneous projections in the ♂ genitalia; the HW underside white line is not wavy but not fully straight (from the costal side) - it is slightly prominent internally (especially in the ♀♀); submarginal pattern reduced; *S. muksuria spec. nov.* from Peter the Great range, with unusual an wing shape, reduced submarginal pattern on the upperside, strongly reduced membraneous projections, vestigial androconium and practically straight white line on the HW underside; *S. zabirovi spec. nov.* from Vanch (NW Pamirs), looking similar to the previous species but with the normal (common for the group) wing shape; the projections are larger, the underside pattern is more developed. *S. mirabilis* (ERSCH.) populates all other territories and has a developed but thin and long androconial patch, conspicuous but small membranous projections, a wavy white line and a complete submarginal pattern on the HW underside.

All species have specific shape of the valva and often specific characters of the aedeagus, the details of the underside pattern being also specific. The similarity between *S. mirabilis* (ERSCH.) from Tian-Shan, Alai and Ghissar confirms that the distribution area of the species has been extended recently, so that the macropopulations still have not accumulated serious distinctions. On the contrary, the southern populations of the species demonstrate some differences while the distance between them is small. So, it is necessary to put more attention to the butterflies populating the borders of the Tadjik Depression.

The status of the *mirabilis*-like populations from West Pamirs needs further clarification, this problem being definitely related to the status of *S. khowari* CHARMEUX.

It is easy to suppose that new taxa will be not found in the northern part of Central Asia, while Iran, Turkmenistan, South Tadjikistan and Afghanistan should be investigated more seriously.

**Note:** We also examined 3 ♂♂ originating from NW India with the label "Hymachal-Pradesh, Kulu, Manali, 2500 m, 30.06.2003" (known at the market under the name "*deria*" and collected by Mr. PATRIKEEV). These specimens are characterized by a thin and long androconial patch, but the ground colour is really black (!), not brown, while the genitalia have some similarity to *S. mirabilis* (ERSCH.) (but not identical). These specimens definitely belong to an unknown species, which we prefer not to describe because it is distributed in the territory which we do not know enough.

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#### Addresses of the authors

SERGEI V. CHURKIN  
Jubileinyi pr., 14-168  
Reutov, 143952, Moscow reg., Russia  
serghelios2007@yahoo.com

VLADIMIR A. PLETNEV  
All-Russian Institute of Plant Protection Chemicals,  
Ugreshskaya str. 31  
Moscow, 115088, Russia

Fig. 1 (a-f)

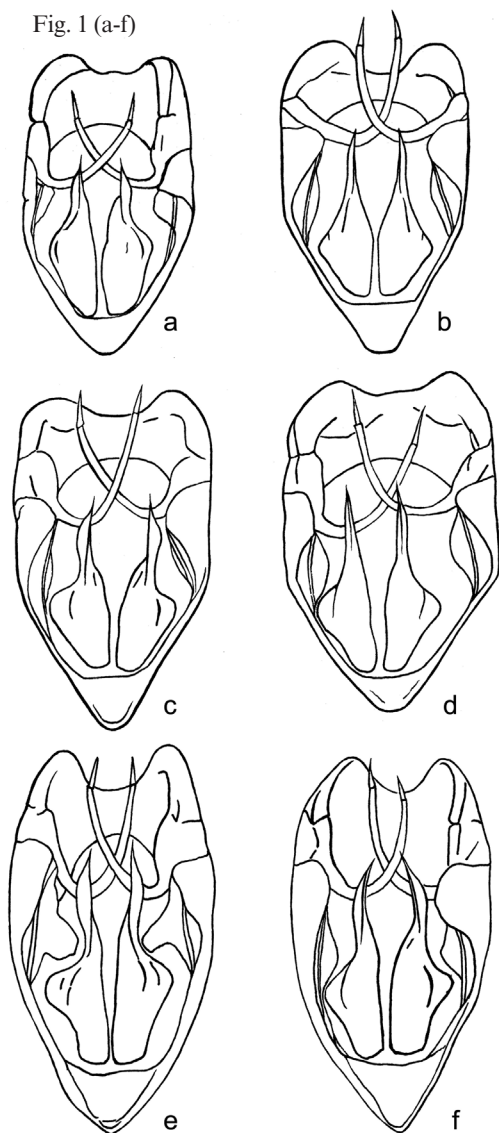


Fig. 2 (a-g)

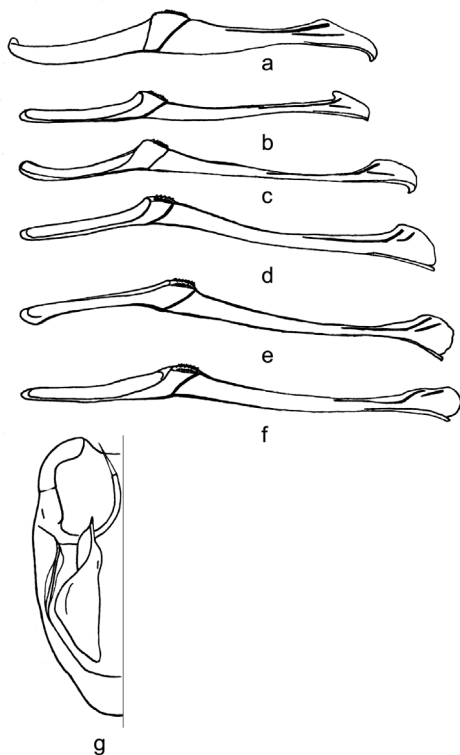


Fig. 2. *Satyrium* (*Superflua*) spp.: aedeagus (a-f) and ♂ genitalia, ventral view (g): a, g - *S. sassanides* (KOLLAR, 1849), Iran, Fars, Kuh-e Bul, Pass W Eglid, 2800 m; b - *S. turkmanica* spec. nov., paratype, W. Turkmenistan, W. Kopetdagh Mts., 15 km E Nokhur v.; c - *S. mirabilis* (ERSCHOFF, 1874), Tadjikistan, West Ghissar, Shing R., Nofin Lake; d - *S. muksuria* spec. nov., paratype, Tadjikistan, Peter the Great Range, Darai-Nazarak v.; e - *S. deria* (MOORE, 1865), Tadjikistan, W. Pamirs, Ishkashimsky range, Ishkashim; f - *S. zabirovi* spec. nov., paratype, Tadjikistan, Darvaz Range, Kalaikhumb vic.

Fig. 1. *Satyrium* (*Superflua*) spp., ♂ genitalia, ventral view: a - *S. turkmanica* spec. nov., paratype, W. Turkmenistan, W. Kopetdagh Mts., 15 km E Nokhur v.; b - *S. mirabilis* (ERSCHOFF, 1874), S. Tadjikistan, Khozratisho Range, Nikolaevsky Pass; c - *S. muksuria* spec. nov., paratype, Tadjikistan, Peter the Great Range, Darai-Nazarak v.; d - *S. mirabilis* (ERSCHOFF, 1874), Tadjikistan, West Ghissar, Shing R., Nofin Lake; e - *S. deria* (MOORE, 1865), Tadjikistan, W. Pamirs, Ishkashimsky range, Ishkashim; f - *S. zabirovi* spec. nov., paratype, Tadjikistan, Darvaz Range, Kalaikhumb vic.

## Buchbesprechung

Ergänzung zur Buchbesprechung Seite 190:

26 MANNHEIMER  
MORGEN

METROPOLREGION

Samstag  
9. MAI 2009

Natur: Walldorfer hat über 600 Meldungen aus der Region ausgewertet / In der Abenddämmerung am Waldrand zu beobachten

# „Hirschkäfer häufiger als angenommen“

Von unserem Redaktionsmitglied  
Simon Scherrenbacher

**RHEIN-NECKAR.** Wer beim Spaziergang durch den Wald einen Hirschkäfer zu Gesicht bekommt, kann sich glücklich schätzen. Das Insekt mit dem eindrucksvollen Geweih ist sehr selten. Stimmt nicht, sagt der Walldorfer Dr. Detlef Mader (Bild). Er hat die Bevölkerung in der Region über die Medien dazu aufgerufen, ihm Funde von Hirschkäfern zu melden. Über 600 Menschen reagierten auf den Aufruf.



Maders Fazit: „Der Hirschkäfer ist häufiger als angenommen.“ Er geht sogar aufgrund der Meldungen von einem „ordentlichen Vorkommen“ aus. „Es hat immer geheissen, dass er selten ist“, bestätigt Mader, der von Haus aus Geologe ist, sich aber nach eigenen Angaben schon immer für Biologie interessiert hat. „Aber der Hirschkäfer hat sich einfach nur gut versteckt.“

**Nur in Abenddämmerung zu sehen**  
Es handele sich zwar um das größte Insekt Mitteleuropas, doch zeigen würde es sich nur in der Abenddämmerung zwischen 20.30 und 22 Uhr am Waldrand, erklärt der Hobby-Biologe. Zudem schwirrt „Lucanus cervus“, so der lateinische Name, nur zwischen Anfang Mai und Anfang August herum. „Am Sonntag habe ich den ersten in diesem Jahr gesehen“, erzählt Mader.

Wetterumschwünge treiben die Hirschkäfer ins Abendlicht, auch die Mondphasen haben einen Einfluss, betont der 55-Jährige. Gerade einmal sechs Wochen werden sie alt, fünf bis sechs Jahre verbringen sie als Larve in der Erde. Die Männchen

## Schutzmaßnahmen

■ Wer einen Hirschkäfer **auf der Straße** sieht, sollte ihn **wegtragen**, damit er nicht überfahren wird.

■ Liegt ein Exemplar auf dem Rücken, sollte man es **auf den Bauch drehen**, weil es das alleine kaum schafft.

■ Einen **Komposthaufen** im Garten anlegen und altes Holz liegenlassen.

■ Mehr Tipps in Detlef Maders Buch **„Populationsdynamik, Ökologie und Schutz des Hirschkäfers (Lucanus cervus) im Raum um Heidelberg und Mannheim“**, Verlag Regionalkultur, 418 Seiten, 49 Euro.

werden einschließlich Geweih etwa sechs bis acht Zentimeter groß, die Weibchen, die mit kürzeren „Kneifzähnen“ ausgestattet sind, rund vier Zentimeter. Wenn er fliegt, liegt der Hirschkäfer im 60-Grad-Winkel mit aufgerichteten Zangen in der Luft und verursacht dabei ein lautes Brummen.

Auf Basis der Fundmeldungen hat Mader innerhalb von wenigen Monaten ein 418 Seiten dickes Buch geschrieben, das im April erschienen ist. Darin geht er unter anderem auch auf den Forschungsstand, die Gefährdung des Insekts und den Einfluss von Klima und den Sternen ein. Wie kam es dazu, dass er das Projekt in Angriff nahm?

Mader weiß es noch genau: „Am 1. Juni 2008 habe ich im Wald direkt neben mir einen Hirschkäfer entdeckt.“ Er erinnerte sich, dass es 35 Jahre her war, dass ihm das letzte Mal ein Exemplar vor die Füße fiel. Dann, nur fünf Tage später, sieht er gleich 25 bis 30 Stück auf einmal im Schwarmflug. „Das hat einen Lärm gemacht wie ein Fluggeschwader.“



Männliche Hirschkäfer werden sechs bis acht Zentimeter groß, weibliche Exemplare bringen es auf etwa vier Zentimeter. BILD: REMERS

Mader ist fasziniert: Zwei Funde innerhalb kürzester Zeit – Zufall oder nicht? „Ich habe angefangen, die Insekten zu beobachten.“ Er startet den Aufruf und beginnt, neben dem Beruf als Immobilienmakler an dem Buch zu arbeiten.

Peter Sandmaier von der Regionalgruppe des Naturschutzbundes in Schwetzingen kann sich der Schlussfolgerung von Mader allerdings nur bedingt anschließen. „Es gibt noch welche, ja“, sagt er. „Aber sie sind durch forstwirtschaftliche Maßnahmen gefährdet.“ Etwa da-

durch, dass verrottete Stämme und Äste aus den Wäldern, auf die die Larven des Hirschkäfers angewiesen sind, wegen Verkehrsfährdung entfernt würden, obwohl das oft gar nicht nötig sei. „In den seltensten Fällen bleibt Altholz liegen.“ Die Art sei zum Teil immer noch rückläufig.

Mader will sich nun als Nächstes dem Nashornkäfer widmen. Er bittet aber auch weiterhin um Meldungen zum Hirschkäfer.

**i** Meldungen an [dr.detlef.mader@web.de](mailto:dr.detlef.mader@web.de) oder 06227/42 52.